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The First Infrared Telescope in Tibet Plateau, China

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Abstract.

We plan to install an infrared telescope at the new site of Tibet, China. The primary mirror diameter is 50cm, and the focal ratio F8. The Xenics 640×512 near infrared camera is employed, equipped with a dedicated high speed InGaAs detector array, working up to 1.7μm. The new site is located on 5100m mountain, near Gar town, Ali, where is an excellent site for both infrared and submillimeter observations. The telescope will be remotely controlled through internet. The goal of IRT is to make site testing, detect variable stars, and search for extrasolar planets.

1. The telescope and site

The telescope made by Meade, a world leader in manufacturing of amateur telescopes. Its primary mirror diameter is 50cm, and the focal ratio is F8. A well sited 50cm telescope could reach the 19 magnitude with a Deep Sky Imager(DSI) by 1 minute.

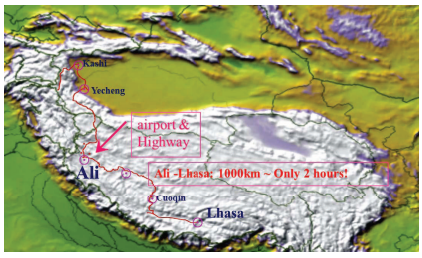

Figure 1. The location of Ali site

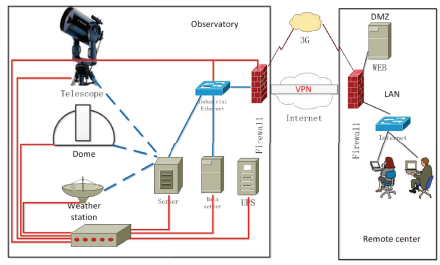

Figure 2. The layout of remote control

The main instruments include a 4K×4K optical camera, and a 640×512 near infrared camera. The STX-16803 optical camera is made by SBIG. The camera has a full frame image buffer for storing image data during download. The XEVA-FPA-1.7-640 infrared camera is one of the revolution in short wave IR cameras, working up to 1.7μm.

The candidate site selected is called Ali, Tibet(Fig1), located at N32°19', E80°01', with altitude of $5100m$[1, 2]. Remote study with the long-term database of ground weather stations and archival satellite data has been performed[3, 4]. The site has enough relative height on the plateau and is accessible by car.

2. Remote and robotic operation

The robotic telescopes are complex systems(Fig2) that combine a lot of subsystems. These subsystems serve to provide telescope pointing capability, control of telescope dome, as well as detection of weather conditions. We are building a $6m$ dome for the infrared telescope. We have already installed satellite antenna in Beijing and Ali for remote observations. The solar power system is also equipped, and the introduction of high voltage power on the site is possible.

3. Goals of science

3.1 Site testing: The telescope will be able to evaluate Ali site of sky quality, atmospheric extinction, etc. It can also get the characterizaiton of the astronomical seeing conditions[5].

3.2 Experiment of high resolution target observations: Fig3 is an image of the International Space Station, taken by a $20cm$ telescope in Beijing. We hope to make further research of image recovery with the $50cm$ telescope on the excellent site.

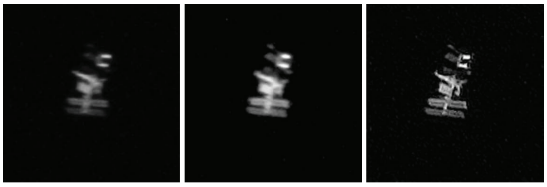

Figure 3. Fig3.1 is the original image from camera; Fig3.2 is processed using Photoshop; Fig3.3 is the restoring object images from the noisy turbulence degraded image of fig3.1.

3.3 Search for extrasolar planets: We will use photometric method to search for extrasolar planets, and we will also develop some new methods to detect the atmospheric compositions of an extrasolar planet.

3.4 Detection of variable stars: Our goal is to detect variable stars and classify these stars in an online catalog in order to approach the origins of variations.

Acknowledgements

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